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**Evans**

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(54) **METHOD AND APPARATUS FOR WINDING STRAPS**

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**B65H 18/04** (2006.01)  
**B65H 54/58** (2006.01)  
**B60P 7/08** (2006.01)

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USPC ..... 242/539, 532.6, 404.2, 406  
See application file for complete search history.

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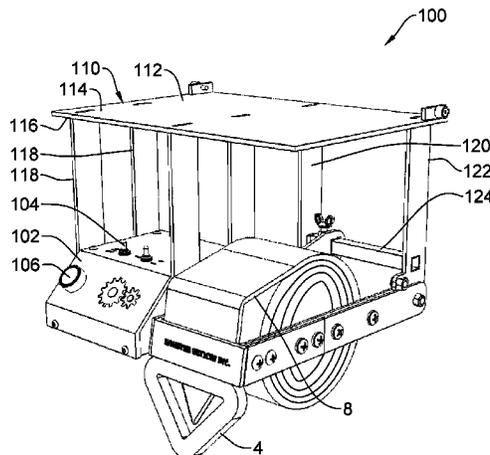
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(57) **ABSTRACT**

An apparatus for winding straps comprises a motor having a shaft extending therefrom to a distal end, the shaft being rotatable thereby along a shaft axis and having a slot extending longitudinally therealong from the distal end. The apparatus further comprises a spool guide located proximate to the distal end of the shaft adapted to retain a strap on the shaft and a strap guide extending parallel to and spaced apart from the shaft axis.

**13 Claims, 13 Drawing Sheets**



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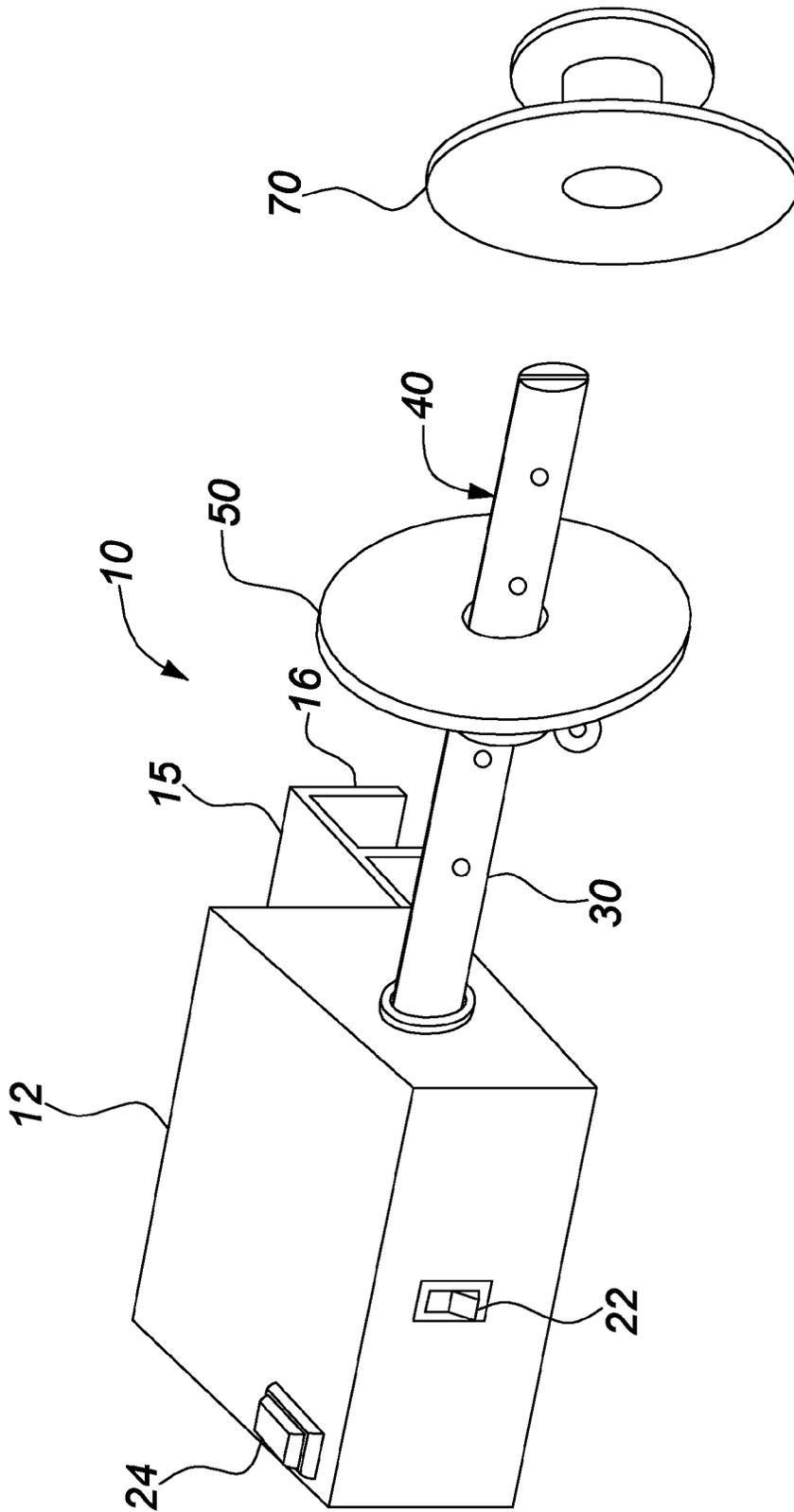


FIG. 1

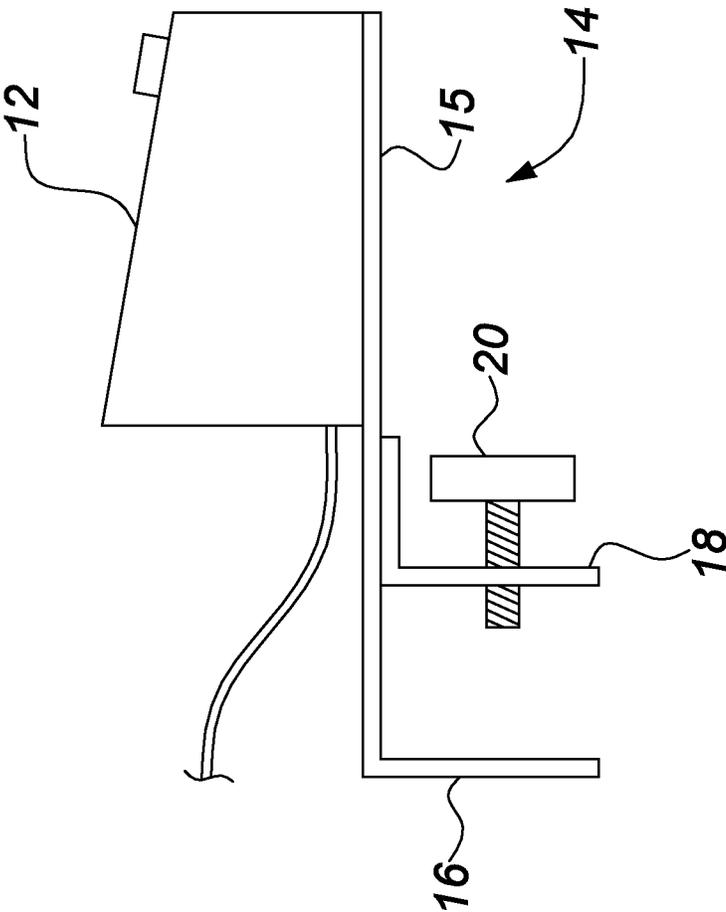


FIG. 2

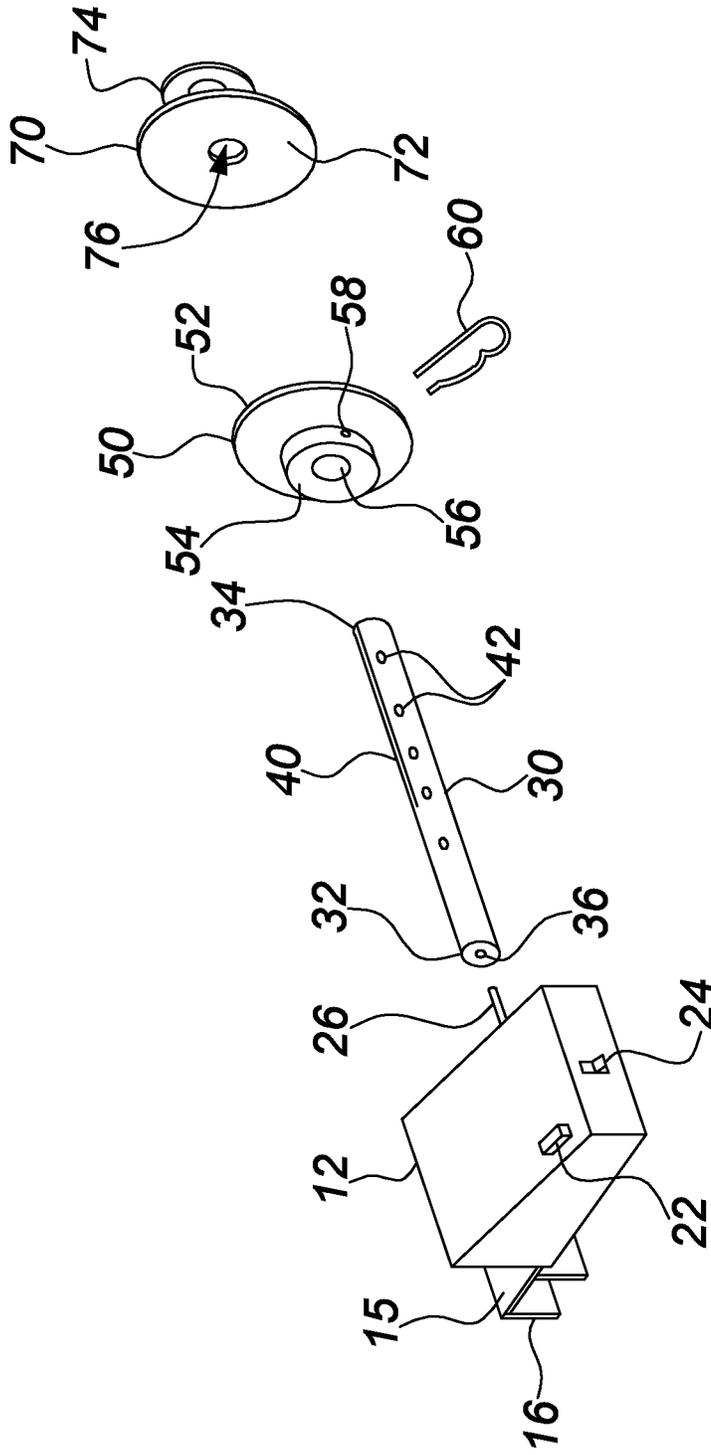


FIG. 3

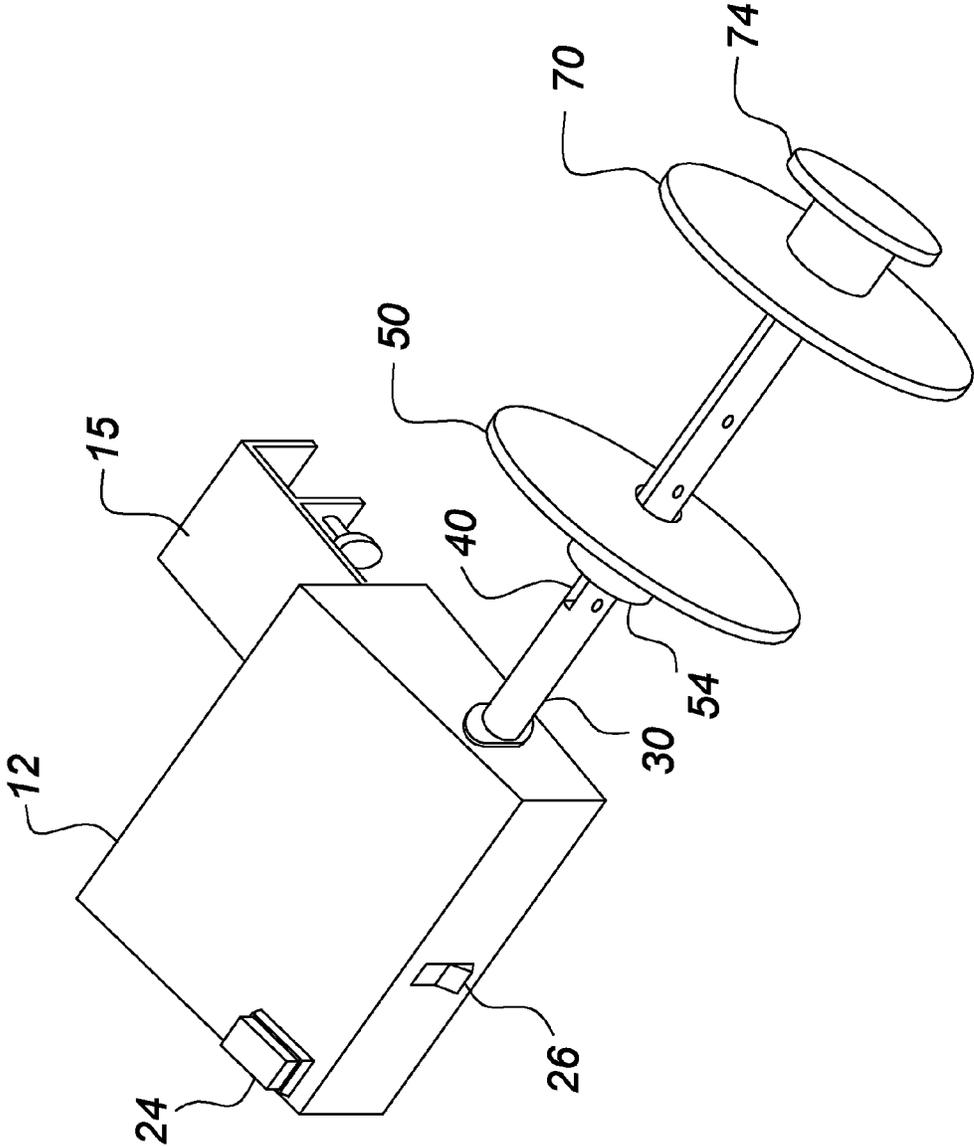


FIG. 4

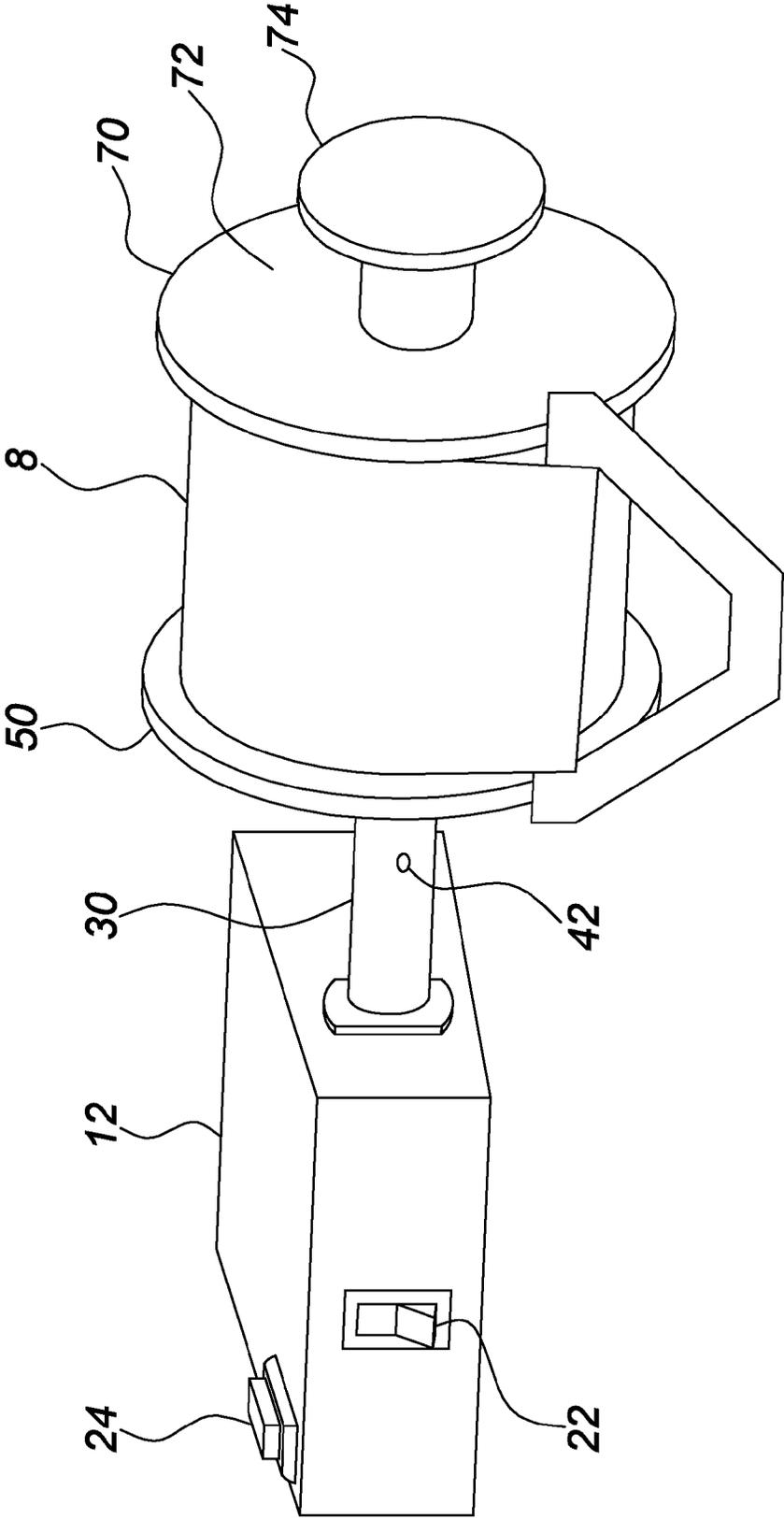


FIG. 5

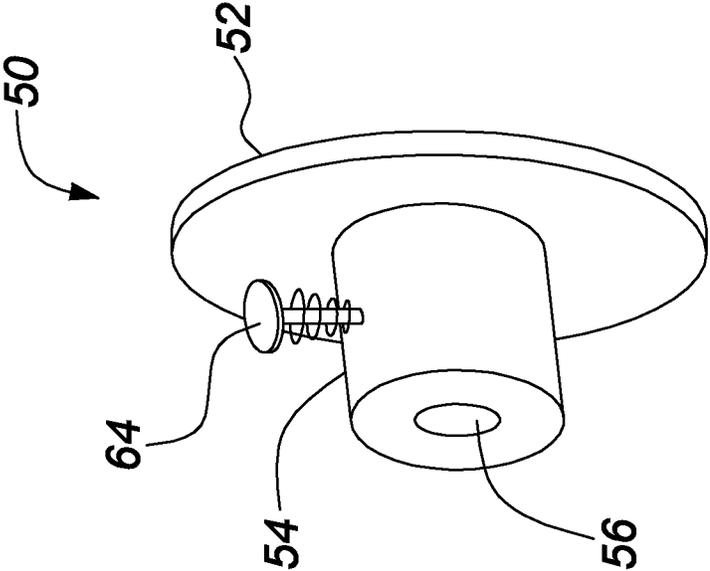


FIG. 6

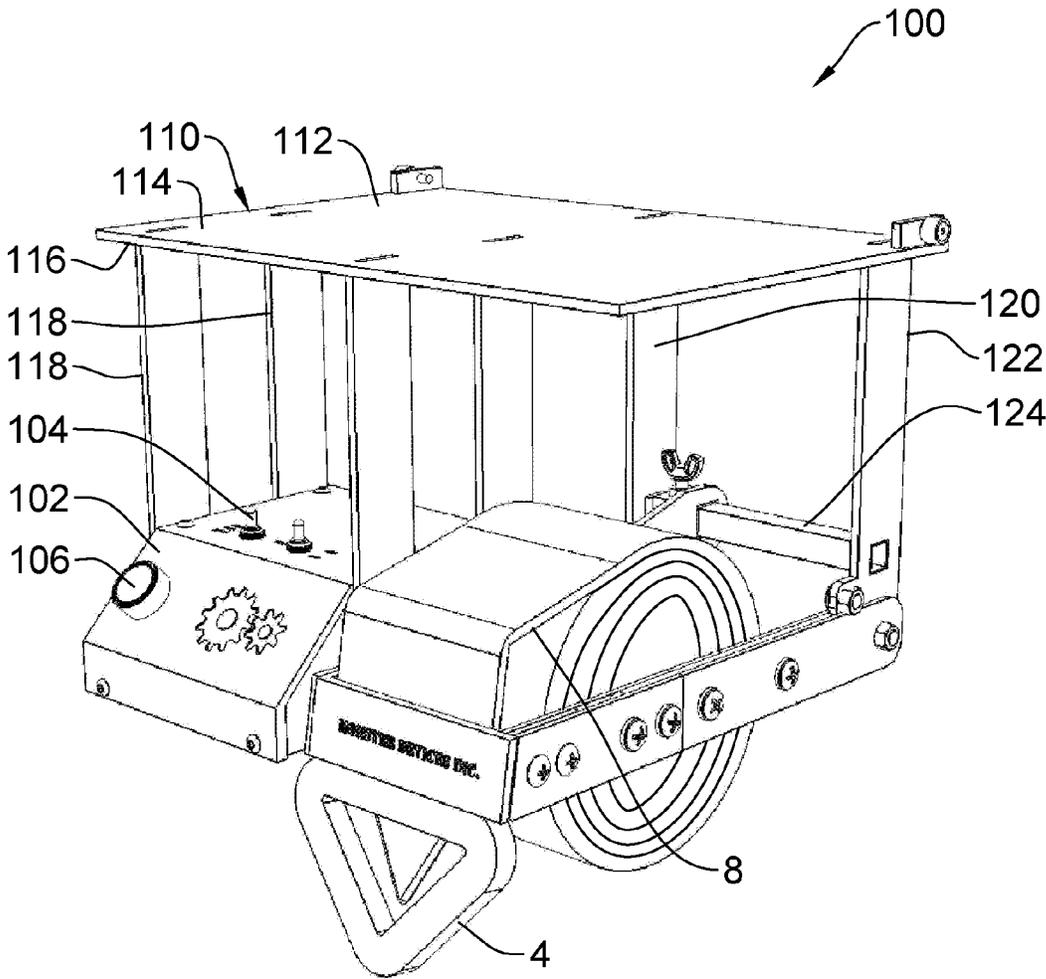


Figure 7

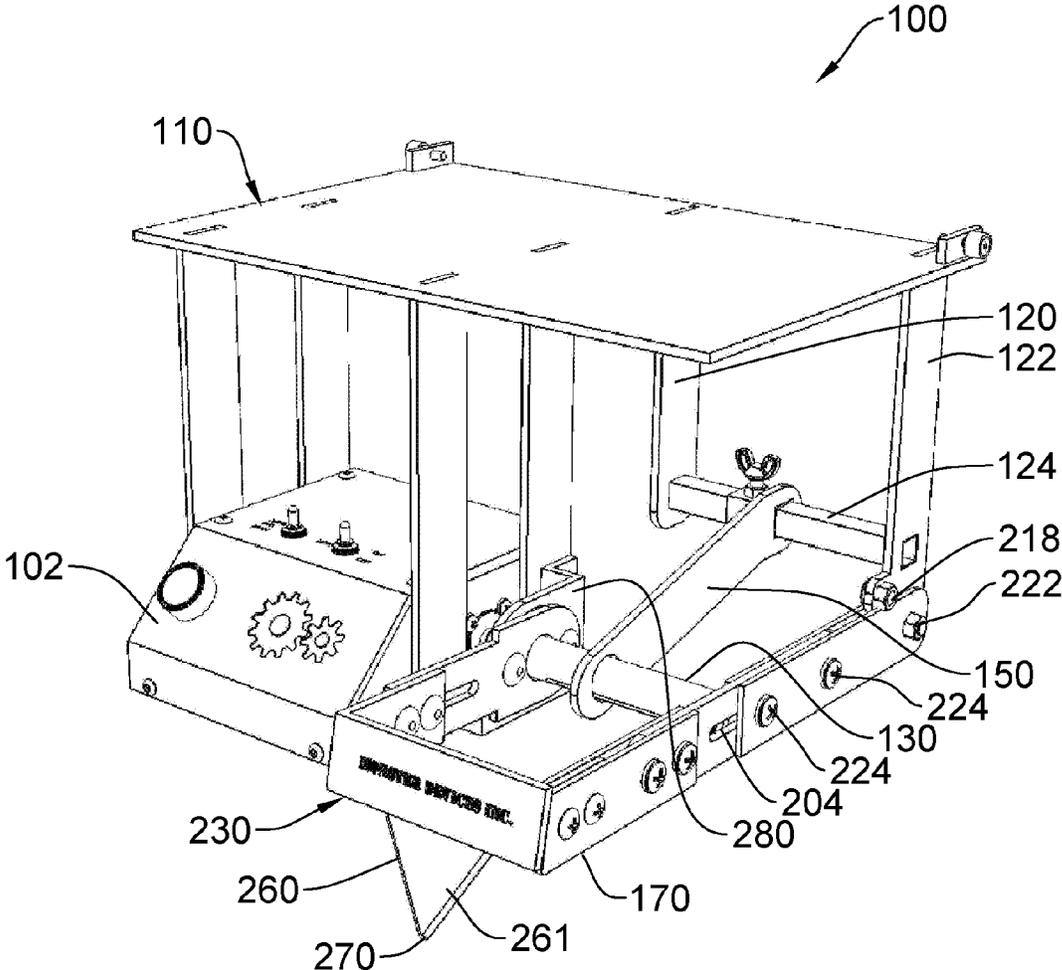


Figure 8

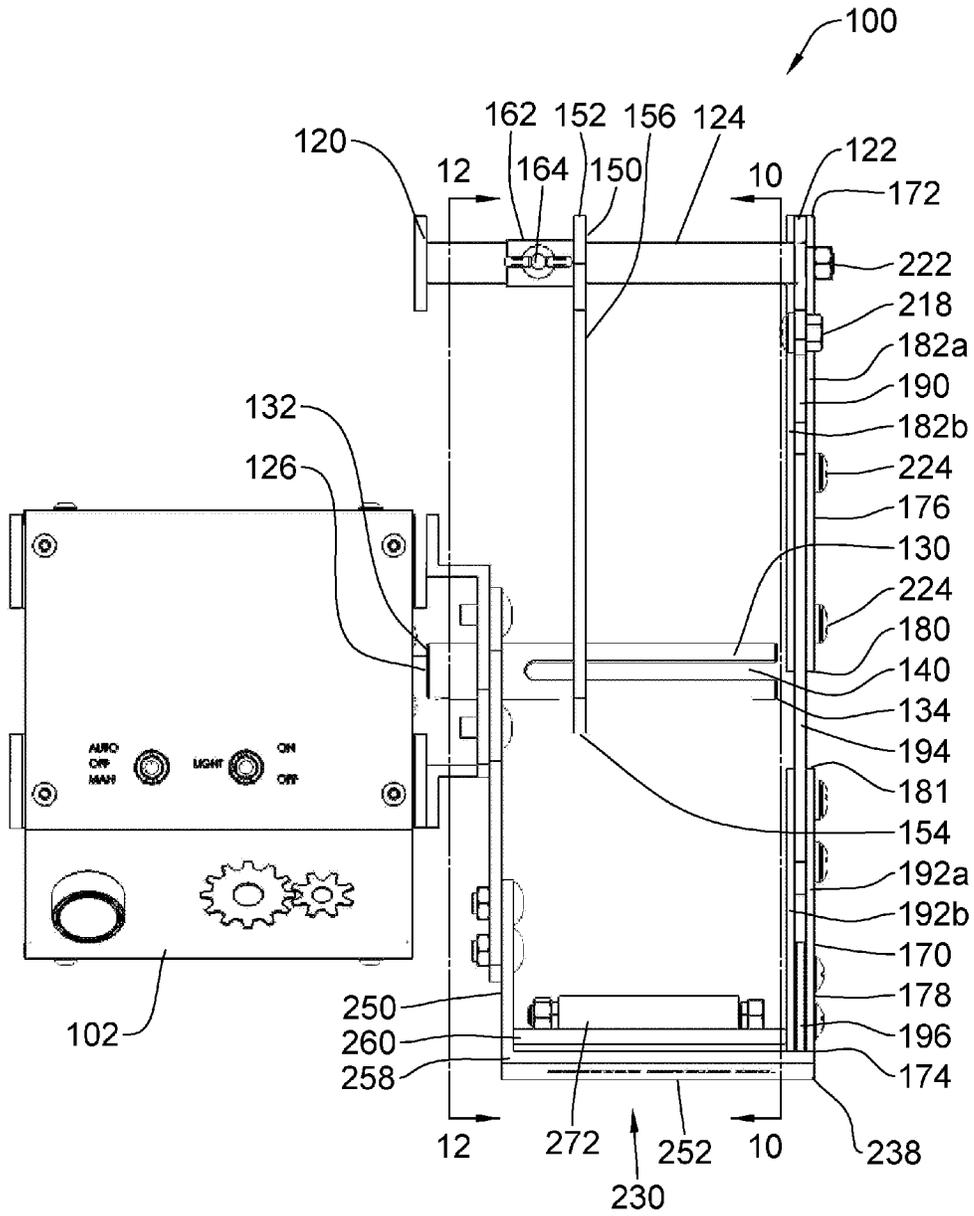


Figure 9

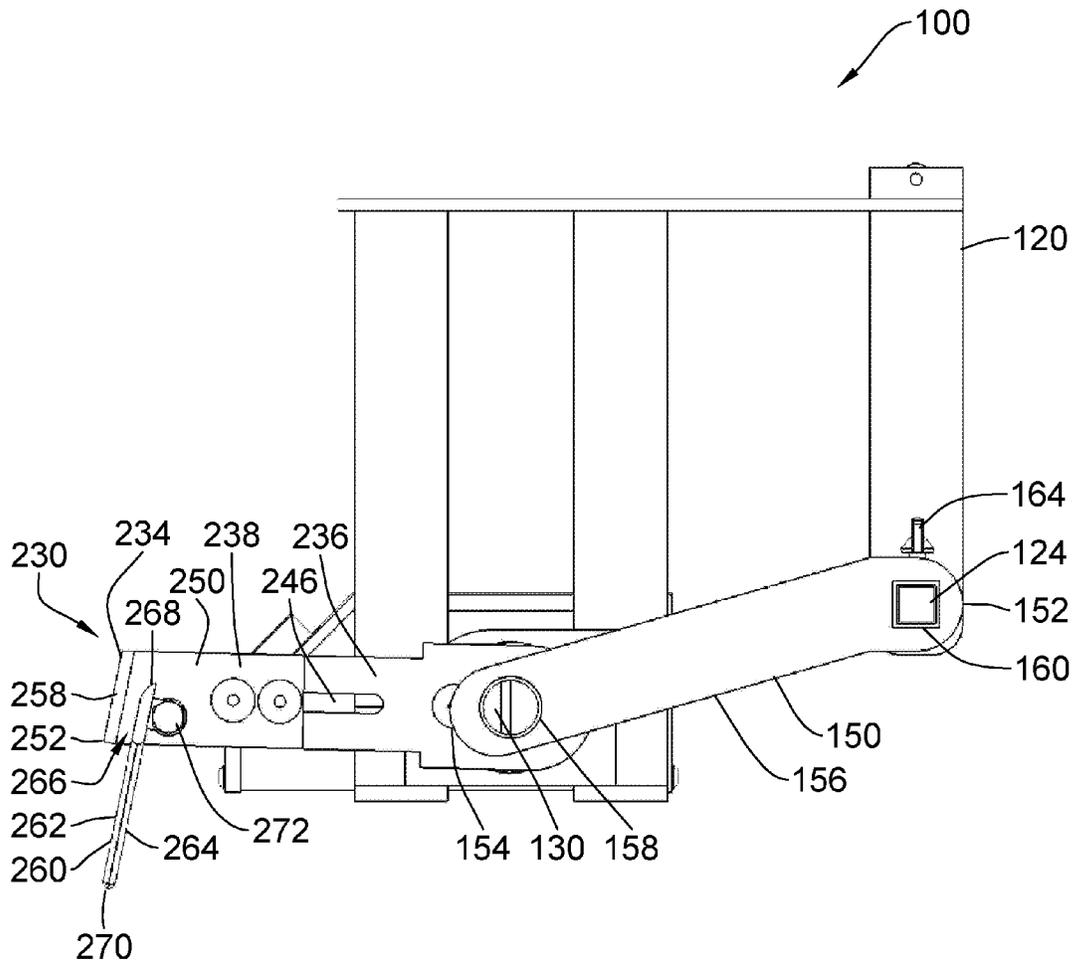


Figure 10

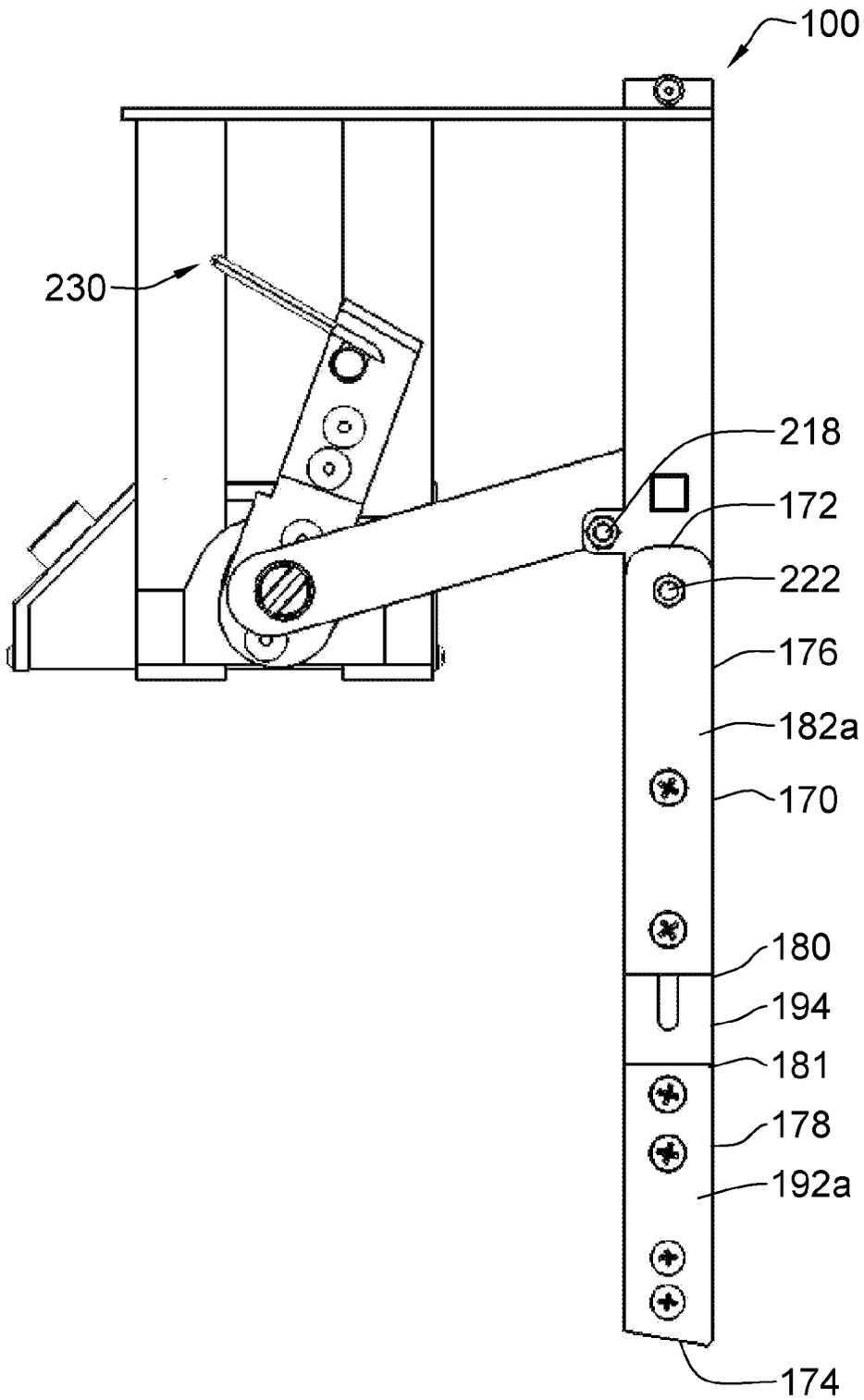


Figure 11



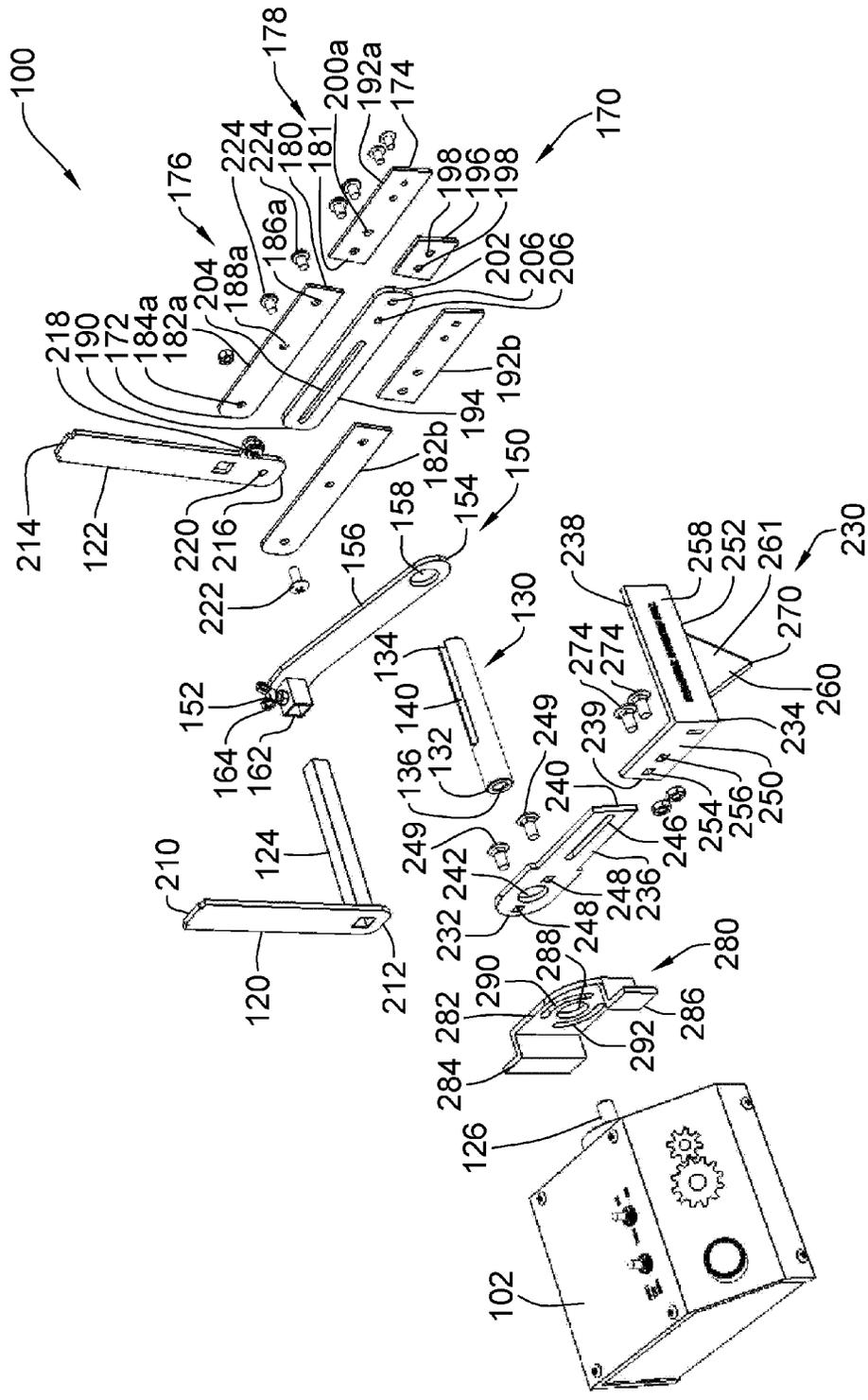


Figure 13

## METHOD AND APPARATUS FOR WINDING STRAPS

### CROSS REFERENCE TO RELATED APPLICATION

This application is a continuation in part application of U.S. patent application Ser. No. 14/796,926 filed Jul. 10, 2015 entitled Method and Apparatus for Winding Straps.

### BACKGROUND OF THE INVENTION

#### 1. Field of Invention

The present invention relates to transportation in general and in particular to a method and apparatus for winding straps.

#### 2. Description of Related Art

In the field of transportation, articles to be transported are frequently located upon flat deck trailers or trucks and secured thereto. One common method of securing such articles to a vehicle is to utilize cargo straps or other flexible tensile members which may be extended over the article and thereafter fastened to the deck. Such straps are commonly formed of nylon, polyester or the like.

One difficulty experienced with the use of such straps is the need to keep such cargo scraps neat and organized in between uses. One common method of maintaining the organization of cargo straps is to roll them into cylindrical or just shapes for compact storage and transportation. However, rolling such straps by hand is a time consuming and difficult task to complete.

Previous attempts have been made to automate the rolling of cargo straps, however such attempts have had drawbacks. In particular, motorized shafts have been provided which may be utilized to wind the straps thereon. Disadvantageously, such devices have required considerable user input to ensure the strap remains straight during any rolling operation and pose safety concerns while the user stands close to the device, guiding the strap.

Additionally, the heavy metal end (D-ring or J-hook) can pose a danger if it is over thrown when it reaches the rotating roll. An example of such devices may be found in US patent application publication number US2012/0145820 to White.

### SUMMARY OF THE INVENTION

According to a further embodiment of the present invention there is disclosed an apparatus for winding straps comprising a motor having a shaft extending therefrom to a distal end, the shaft being rotatable thereby along a shaft axis and having a slot extending longitudinally therealong from the distal end. The apparatus further comprises a spool guide located proximate to the distal end of the shaft adapted to retain a strap on the shaft and a strap guide extending parallel to and spaced apart from the shaft axis.

The strap guide may be located at the end of a strap guide arm extending perpendicular to the shaft axis. The strap guide arm may be rotatable about the shaft axis between a first position substantially horizontally extending from the shaft and a second position past vertically above the shaft. The apparatus may further comprise a limit stop switch adapted to stop the motor when the strap guide arm is at the second position. The strap guide arm may be rotatably secured to a location proximate to the motor. The strap guide arm may be radially lengthenable.

The strap guide may include a slot extending parallel to the shaft axis. The slot may be formed between front and

rear members. The rear member may include an extended tapered edge extending downwardly therefrom. The rear member may include a roller on the rear surface thereof.

The spool guide may comprise a spool guide arm rotatable about an axis parallel to the shaft axis. The spool guide arm may include an extendable distal end portion. The spool guide arm may include a magnet at the distal end portion adapted to engage upon the strap guide. The spool guide arm may include a rotation limit stop adapted to prevent rotation of the spool guide arm above horizontal.

The apparatus may further comprise an adjustable guide arm extending proximate to the shaft so as to position the strap between the adjustable guide arm and the spool guide.

According to a further embodiment of the present invention there is disclosed a method for winding straps comprising passing a free end of a strap through a slot in a shaft extending from a motor, the shaft being rotatable thereby along a shaft axis. The method further comprises passing the strap through a strap guide extending parallel to and spaced apart from the shaft axis and rotating the shaft so as to wind the strap thereabout until a distal end of the strap engages upon the strap guide thereby rotating the strap guide upwardly about the shaft and disengaging a magnetic end of a spool guide located proximate to the distal end of the shaft so as to permit the spool guide to rotate downward permitting removal of the strap from the shaft.

Other aspects and features of the present invention will become apparent to those ordinarily skilled in the art upon review of the following description of specific embodiments of the invention in conjunction with the accompanying figures.

### BRIEF DESCRIPTION OF THE DRAWINGS

In drawings which illustrate embodiments of the invention wherein similar characters of reference denote corresponding parts in each view,

FIG. 1 is a perspective view of an apparatus for winding straps mounted to a trailer according to a first embodiment of the present invention.

FIG. 2 is a side view of the apparatus of FIG. 1.

FIG. 3 is an exploded view of the apparatus of FIG. 1.

FIG. 4 is a perspective view of the apparatus of FIG. 1 with the guide flange positioned to receive a strap.

FIG. 5 is a perspective view of the apparatus of FIG. 1 with a strap wound therearound.

FIG. 6 is a perspective view of a guide flange according to a further embodiment of the present invention.

FIG. 7 is a perspective view of an apparatus for winding straps according to a further embodiment of the present invention with a strap wound therearound.

FIG. 8 is a perspective view of the apparatus of FIG. 7 in a second, extended position, with the strap guide adjusted.

FIG. 9 is a top view of the apparatus of FIG. 7.

FIG. 10 is a side cross sectional view of the apparatus of FIG. 7, taken along the section lines 10-10.

FIG. 11 is a side view of the apparatus of FIG. 7, in a second position, with the fairlead arm rotated upwards and the guide arm rotated downwards.

FIG. 12 is a partial cross sectional view of the apparatus of FIG. 7, as taken along the section lines 12-12.

FIG. 13 is an exploded view of the apparatus of FIG. 7.

### DETAILED DESCRIPTION

Referring to FIGS. 1 and 5, an apparatus for winding a strap 8 into a roll according to a first embodiment of the

invention is shown generally at **10**. The apparatus comprises a motor **12** securable to a vehicle **6** (not shown). The motor **12** rotates a shaft **30** having a guide flange **50** and a guide cap **70** thereon between which the strap is wound, as will be more fully described below.

The motor **12** may be of any conventional type, such as by way of non-limiting example, electric, pneumatic or hydraulic. It will be appreciated that the motor **12** may be powered by a power source located on the vehicle through a power cable or may optionally include a battery (not shown) which may be recharged as required by any conventional means. As illustrated in FIG. 2, the motor includes a mounting assembly, generally indicated at **14** for securing the apparatus to a vehicle **6**. In particular, the mounting assembly may comprise a plate **15** to which the motor **12** is secured using any known means, such as, by way of non-limiting example, fasteners, welding, adhesives or the like. The mounting assembly **14** includes an end backing plate **16** and a parallel spaced apart clamping plate **18** extending downwardly therefrom. The clamping plate **18** includes a threaded member **20** extending therethrough adapted to be turned within the clamping plate **18** so as to clamp a portion of the vehicle between the threaded member and the backing plate **16** thereby securing the plate **15** and motor **12** to a vehicle. It will be appreciated that the motor may be contained within a casing as illustrated in FIG. 1. The motor may also have an associated power switch **22** and/or activation button **24**. In operation, the power switch may enable operation wherein the activation button may cause the motor shaft to rotate.

Turning now to FIG. 3, the apparatus **10** includes a shaft **30** extending from the motor **12** which is adapted to be turned by the motor. It will be appreciated that the shaft **30** may be secured directly to or co-formed with the motor shaft (not shown) or may be connected thereto and rotated thereby through a gear or other drive assembly. The shaft **30** extends between proximate and distal ends, **32** and **34**, respectively wherein the proximate end **32** may include a bore **36** for securing to an output shaft **26** from the motor **12**. The bore **36** may be secured over the output shaft **26** through any conventional means, such a threading, fasteners, adhesives, welding or the like. The shaft **30** includes a slot **40** extending along a portion of the length thereof from the distal end **34**. The slot **40** has a width corresponding to the thickness of a strap to be wound, such as, by way of non-limiting example, between  $\frac{1}{8}$  and  $\frac{3}{8}$  inches (3 and 10 mm). The slot **40** has a length adapted to extend along the shaft **30** a sufficient length to permit a range of straps to be inserted therein, such as up to 80 percent of a shaft, although it will be appreciated that greater percentages may be utilized provided the shaft retains sufficient strength. The shaft **30** further includes a plurality of transverse bores **42** extending therethrough. As illustrated in FIG. 3, the transverse bores **42** extend transversely to the slot **40** so as to pass therethrough. The transverse bores **42** are located at locations along the shaft **30** selected to receive and retain a strap between the guide flange **50** and the guide cap **70** as will be more fully described below. The shaft **30** may be formed of a magnetic material or may optionally have magnets embedded therein so as to retain the guide cap thereon as will be more fully described below.

The guide flange **50** comprises a body having a flange portion **52** and a collar portion **54** extending therefrom. The flange and collar portions each include a bore **56** therethrough sized to correspond to the shaft **30**. The collar portion **54** includes a locating bore **58** therethrough sized to receive a pin **60** or other fasteners therethrough. In opera-

tion, the pin **60** may be passed through the locating bore **58** and an aligned transverse bore **42** in the shaft to fix the location of the guide flange **50** upon the shaft **30**. Alternatively, it will be appreciated that other means for locating the guide flange at a desired location may also be utilized such as indentations, spring loaded pins **64** or the like, as illustrated in FIG. 6.

The guide cap **70** comprises a body having a flange portion **72** and a collar portion **74** extending therefrom. The flange and collar portions include a blind bore **76** which does not extend completely through the collar portion **74** as illustrated in FIGS. 4 and 5. The guide cap **70** is formed of a ferromagnetic material or may optionally include magnets embedded therein so as to be drawn towards the shaft **30** such that the distal end **34** of the shaft is drawn into and located within the blind bore **76**. Optionally, the blind bore **76** of the guide cap **70** may include alternative means for retaining the guide cap **76** upon the distal end **34** of the shaft **30**, such as, by way of non-limiting example, snap rings, annular ridges, friction fit, spring loaded rollers or the like as are commonly known.

In operation, the guide flange **50** may be located along the shaft at a location corresponding to the width of the strap to be wound and a pin **60** passed through the locating bore **58** and transverse bore **42** to fix the position thereof. Thereafter, blind bore **76** of the guide cap **70** may be located upon the distal end **34** of the shaft **30** such that the distal end **34** is retained therein by the magnets. A free end of the strap **8** may then be passed through the slot **40** between the guide flange **50** and the guide cap **70** and the motor engaged by the activation button **24** to rotate the shaft **30** thereby winding the strap **8** about the shaft **30** to a wound position as illustrated in FIG. 5. Thereafter, the guide cap **70** may be removed from the shaft **30** and the wound strap **8** slidably removed from the end of the shaft quickly and neatly.

Now turning to FIGS. 7 and 8, an apparatus for winding a strap **8** into a roll according to a further embodiment of the invention is shown generally at **100**. The apparatus comprises a motor **102** secured to a frame assembly **110** securable to a vehicle **6**. The motor **102** rotates a shaft **130** extending through a strap guide assembly **230** and an adjustable guide arm **150**, with an extendable spool guide swing arm **170** proximate to the distal end thereof, between which the strap **8**, having a hook or ring **4** at the distal end thereof, is wound, as will be more fully described below.

The frame assembly **110** includes a top plate **112**, having top and bottom surfaces **114** and **116**, respectively, securable to a vehicle **6** proximate to the top surface **114** by any known means, and a plurality of support hangers **118** attached transversely therefrom the bottom surface **116** by any known means, to which the motor **102** is secured. First and second guide rod support arms, **120** and **122**, respectively, extend transversely from the bottom surface **116**, with a guide rod **124** extending therebetween, the purpose of which will be set out in more detail below.

The motor **102** may be of any conventional type, such as by way of non-limiting example, electric, pneumatic or hydraulic. It will be appreciated that the motor **102** may be powered by a power source located on the vehicle through a power cable (not shown) or may optionally include a battery (not shown) which may be recharged as required by any conventional means. As set out above, the motor **102** may be mounted to or supported by the frame assembly **110**. In particular, the frame assembly **110** may comprise a plurality of support hangers **118** to which the motor **102** is secured using any known means, such as, by way of non-limiting example, fasteners, welding, adhesives or the like.

It will be appreciated that the motor **102** may be contained within a casing as illustrated in FIGS. **7** and **8**. The motor may also have an associated power switch **104** and/or activation button **106**. In operation, the power switch **104** may enable operation wherein the activation button **106** may cause the motor shaft to rotate. The power switch **104** may have an automatic option, such that the motor shaft will rotate with a push and release of the activation button **106**, and/or it may have a manual option, such that the motor shaft will rotate only when the activation button **106** is held down continuously.

Referring to FIGS. **9** and **13**, the apparatus **100** includes a shaft **130** extending from the motor **102** which is adapted to be turned by the motor. It will be appreciated that the shaft **130** may be secured directly to or co-formed with the motor shaft (not shown) or may be connected thereto and rotated thereby through a gear or other drive assembly. The shaft **130** extends between proximate and distal ends, **132** and **134**, respectively wherein the proximate end **132** may include a bore **136** for securing to an output shaft **126** from the motor **102**. The bore **136** may be secured over the output shaft **126** through any conventional means, such as threading, fasteners, adhesives, welding or the like. The shaft **130** includes a slot **140** extending along a portion of the length thereof from the distal end **134**. The slot **140** has a width corresponding to the thickness of a strap to be wound, such as, by way of non-limiting example, between  $\frac{1}{8}$  and  $\frac{3}{8}$  inches (3 and 10 mm). The slot **140** has a length adapted to extend along the shaft **130** a sufficient length to permit a range of straps to be inserted therein, such as up to 80 percent of a shaft, although it will be appreciated that greater percentages may be utilized provided the shaft retains sufficient strength.

Referring to FIGS. **8** and **13**, the first and second guide rod support arms, **120** and **122**, respectively, extend transversely from the bottom surface **116** of the frame assembly **110**, with a guide rod **124** extending therebetween, as set out above. The first guide rod support arm **120** extends between a first end **210** proximate to the bottom surface **116** of the top plate **112** and a second end **212**. The second guide rod support arm **122** extends between a first end **214** proximate to the bottom surface **116** of the top plate **112** and a second end **216**.

The second guide rod support arm **122** includes a rotation limit stop **218** extending therefrom proximate to the second end **216**, the purpose of which will be set out below. A transverse hinge bore **220** extends therethrough the second guide rod support arm **122** proximate to the second end **216**. The guide rod **124** extends between the first and second guide rod support arms, **120** and **122**, proximate to the second ends, **212** and **216**, as will be more fully described below.

Referring to FIGS. **8**, **9** and **13**, the apparatus **100** includes a strap guide assembly **230** extending between first and second ends, **232** and **234**, respectively, comprised of a base portion **236** and an extendable portion **238**. The base portion **236** extends between the first and a second ends **232** and **240**, respectively, and includes a circular shaft bore **242** proximate to the first end, adapted to allow the shaft **130** to pass therethrough, and a slot **246** extending along a portion of the length thereof from proximate to the second end **240**. A plurality of transverse slot pin bores **248** are positioned therearound the circular shaft bore **242**, sized to receive a plurality of slot pins **249**.

The extendable portion **238** extends between a first end **239** and the second end **234** and is comprised of a side plate **250** and a front assembly **252**. The side plate **250** extends between the first and second ends, **239** and **234**, respectively,

and includes first and second slot pin bores, **254** and **256**, respectively, therealong spaced apart less than the length of the slot **246** of the base portion **236**. Referring now to FIG. **10**, the front assembly **252** includes a front plate **258** extending transversely from the side plate **250** at the second end **234**, with a rear plate **260**, having first and second surfaces, **262** and **264**, respectively, extending transversely from the side plate **250**, spaced apart from the front plate **258** to form a gap **266** therebetween. The gap **266** distance may be in the range of such as, by way of non-limiting example,  $\frac{1}{8}$  to  $\frac{1}{2}$  inches (3 to 13mm) to permit a strap **8** to pass therethrough. The rear plate **260** extends between top and bottom edges, **268** and **270**, respectively. As best seen in FIG. **9**, the rear plate **260** extends between the side plate **250** and the extendable spool guide swing arm **170** at the top edge **268**. As best seen in FIGS. **8** and **13**, the rear plate **260** includes a tongue portion **261** tapering to a point at the bottom edge **270**. It will be appreciated that it may be useful to form the tongue portion **261** in other shapes, as well. As best seen in FIG. **9**, a roller assembly **272**, as is commonly known, extends from the second surface **264** of the rear plate **260**, the purpose of which will set out in more detail below.

The strap guide assembly **230** may be assembled with the base portion **236** aligned with the extendable portion **238** such that the first and second slot pin bores, **254** and **256**, may be aligned with the slot **246**, with slot pins **274** therethrough. The slot pins **274** may be such as, by way of non-limiting example, bolts, screws, rivets or the like. As the slot pins **274** are spaced apart a distance less than the length of the slot **246**, as set out above, the strap guide assembly **230** may extend from a first position, as best seen in FIG. **7**, to a fully extended position, as best seen in FIG. **8**, with the extending portion permitting slidable movement along the slot **246**. The purpose of the extendable feature will be set out below. It will be appreciated that other slide types may be possible, as well.

Referring to FIGS. **8**, **9**, **12** and **13**, the strap guide assembly **230** may be mounted to a strap guide bracket **280**, as will be described in more detail below. The strap guide bracket **280** comprises a front plate **282**, extending between top and bottom edges, **310** and **312**, respectively, and first and second sides **314** and **316**, respectively, with parallel, spaced apart first and second mounting plates, **284** and **286**, respectively, extending transversely therefrom at the first and second sides, **314** and **316**. The first and second mounting plates, **284** and **286**, may be secured to the frame assembly **110** using any known means, such as, by way of non-limiting example, fasteners, welding, adhesives or the like. Referring to FIGS. **12** and **13**, the front plate **282** includes a circular shaft bore **288**, adapted to allow the shaft **130** to pass therethrough, with first and second arc slots **290** and **296**, respectively, distributed therearound, sized to receive the slot pins **249**. The first arc slot **290** extends between first and second stops, **292** and **294**, respectively, such that the first stop **292** may be horizontally aligned with the circular shaft bore **288**, proximate to the second side **316** and the first arc slot **290** may extend to the second stop **294** through a rotational angle of such as, by way of non-limiting example, 95 to 100 degrees, with the second stop **294** proximate to the top edge **310**. The second arc slot **296** extends between first and second stops, **298** and **300**, respectively, such that the first stop **298** may be horizontally aligned with the circular shaft bore **288**, proximate to the first side **314** and the second arc slot **296** may extend to the second stop **300** through a rotational angle of such as, by way of non-limiting example, 95 to 100 degrees, with the

second stop **300** proximate to the bottom edge **312**. The first and second arc slots **290** and **296**.

As best seen in FIG. **8**, the strap guide bracket **280** may be secured to the frame assembly **110** as set out above, with the shaft **130** passing therethrough the circular shaft bore **288**. The strap guide assembly **230** may be aligned with the strap guide bracket **280**, with the shaft **130** passing there-  
through the circular shaft bore **242**, and the transverse slot pin bores **248** aligned with the first and second arc slots, with the slot pins **249** therethrough. The strap guide assembly **230** may rotate between a first position, as shown in FIG. **8**, with the slot pins **249** aligned at the first stops **292** and **298**, and a second position, as shown in FIG. **11**, with the slot pins **249** aligned at the second stops **294** and **300**. When the slot pins **249** are aligned in the first and second arc slots **290** and **296** at the second stops **294** and **300**, a limit switch (not shown) may disengage the motor **12** such that it ceases operation.

Referring now to FIGS. **9**, **11** and **13**, the extendable spool guide swing arm **170** extends between first and second ends, **172** and **174**, respectively, and is comprised of a swingable portion **176** extending from the first end **172**, and an extending portion **178** extending from the second end **174**. The extending portion **178** extends between a first end **190** and second end **174**, and is comprised of first and second plates **192a** and **192b**, respectively, with a sliding plate **194** and a magnetic plate **196** therebetween. Each of the first and second plates, **192a** and **192b**, are formed the same, extending between a first end **181** and the second end **174**, with a plurality of transverse bores **200a** and **200b**, extending therethrough. The magnetic plate **196** is selected to be of a shorter length than the first and second plates **192a**, **192b** and includes a plurality of transverse bores **198** extending therethrough, located therealong and selected to be aligned with a portion of the transverse bores **200a**, **200b** of the first and second plates **192a**, **192b** proximate to the second end **174**. The magnetic plate **196** may be formed of a magnetic material or may optionally have magnets imbedded therein proximate to the second end **174** so as to engage upon the strap guide assembly **230** as will be more fully described below. The sliding plate **194** extends between the first end **190** and a second end **202** and includes a slot **204** extending along a portion of the length thereof from proximate to the first end **190**, and a plurality of transverse bores **206** extending therethrough, located therealong proximate to the second end **202**. The transverse bores **206** are selected to be aligned with a portion of the transverse bores **200a**, **200b** of the first and second plates **192a**, **192b** proximate to the first end **181**. The extending portion **178** may be assembled with bolts, screws, rivets or the like therethrough the aligned transverse bores, as is commonly known, such that the portion of the sliding plate **194** with the slot **204** extends from the first end **181** of the first and second plates **192a**, **192b**, as seen in FIGS. **8** and **11**. Although the extending portion **178** is illustrated in the present embodiment of the invention with both first and second plates **192a**, **192b**, it will be appreciated that the extending portion **178** could be fabricated with one plate **192**, or the magnetic plate **196** could be conformed with the sliding plate **194**, without the plates **192a** or **192b**.

The swingable portion **176** of the extendable spool guide swing arm **170** extends between the first end **172** and a second end **180**, and is comprised of first and second plates **182a** and **182b**, respectively. Each plate, **182a** and **182b**, is formed the same, with transverse hinge bores **184a** and **184b** extending therethrough proximate to the first end **172**, transverse end bores **186a** and **186b** extending therethrough proximate to the second end **180**, and transverse mid bores **188a** and **188b** extending therethrough therebetween. The

transverse hinge bores **184a**, **184b** are selected to be aligned with the transverse hinge bore **220** of the second guide rod support arm **122**. The transverse mid bores **188a**, **188b** are positioned a distance apart from the transverse end bores **186a**, **186b** that is less than the length of the slot **204** of the extending portion **178**. The extendable spool guide swing arm **170** may be assembled with the second guide rod support arm **122** and the sliding plate **194** aligned between the first and second plates **182a**, **182b** such that the transverse hinge bores **184a**, **220** and **184b** are aligned, with a pivot pin **222** therethrough, and the transverse mid and end bores **188a**, **188b** and **186a**, **186b** are aligned with the slot **204**, with slot pins **224** therethrough. The pivot pin **222** and slot pins **224** may be such as, by way of non-limiting example, bolts, screws, rivets or the like. Although the swingable portion **176** is illustrated in the present embodiment of the invention with both first and second plates **182a** and **182b**, it will be appreciated that the swingable portion **176** could be fabricated with one plate **182**.

When assembled, the extendable spool guide swing arm **170** may pivot about the pivot pin **222** through the hinge bores **184a**, **220** and **184b**, permitting the extendable spool guide swing arm **170** to rotate between a lowered position, as best seen in FIG. **11**, and a raised position, as best seen in FIG. **8**. The rotation limit stop **218** prevents the extendable spool guide swing arm **170** from pivoting upwards beyond the raised position shown in FIG. **8**. The magnetic plate **196** engages upon the strap guide assembly **230** in the raised position, retaining the extendable spool guide swing arm **170** thereon. As the slot pins **224** are spaced apart a distance less than the length of the slot **204**, as set out above, the extendable spool guide swing arm **170** may extend from a first position, as best seen in FIG. **7**, to a fully extended position, as best seen in FIG. **8**, with the extending portion permitting slidable movement along the slot **204** to maintain the magnetic plate **196** in contact upon the strap guide assembly **230**.

Referring to FIGS. **9**, **10** and **13**, the adjustable guide arm **150** extends between first and second ends, **152** and **154**, respectively, and is comprised of a plate portion **156** and a tubular clamp portion **162** extending from the first end **152** thereof. The plate portion **156** includes a circular shaft bore **158** therethrough proximate to the second end **154**, adapted to allow the shaft **130** to pass therethrough, and a guide rod bore **160** therethrough proximate to the first end **152**, adapted to allow the guide rod **124** to pass therethrough. The tubular clamp portion **162** extends transversely from the plate portion **156** proximate to the first end **152** and is aligned with the guide rod bore **160**, and is adapted to allow the guide rod **124** to pass therethrough. The tubular clamp portion **162** includes a set screw **164**, as is commonly known, to secure the adjustable guide arm **150** to the guide rod **124**. The adjustable guide arm **150** may be positioned and secured at any location along the guide rod **124** to allow for various strap **8** widths. While the guide rod **124** is illustrated in the current embodiment of the invention with a square cross section, it may be appreciated that other profiles, such as, by way of non-limiting example, a circular cross section, may be useful, as well.

In operation, the adjustable guide arm **150** may be located along the guide rod **124** corresponding to the width of the strap **8** to be wound, with the set screw **164** engaged to fix the position thereof. The strap guide assembly **230** may be positioned in the first position with the extendable spool guide swing arm **170** in the raised position, as illustrated in FIG. **7**. A free end of the strap **8** may then be passed through the gap **266** from proximate the bottom edge **270** of the rear

plate 260, and through the slot 140 between the adjustable guide arm 150 and the extendable spool guide swing arm 170, and the motor 102 turned on by the activation button 106 to rotate the shaft 130. As the strap 8 is wound into a roll, as illustrated in FIG. 7, the diameter of the roll may be such that it may engage upon the roller assembly 272, shown in FIGS. 9 and 10. Thereafter, as the roll increases in diameter, engaging upon the roller assembly 272, the strap guide assembly 230 and the extendable spool guide swing arm 170 may extend in length as required for the diameter of the roll, to the extended position as shown in FIG. 8. Thereafter, the hook 4 at the distal end of the strap 8 may engage upon the strap guide assembly 230, rotating the strap guide assembly 230 to the raised position, as seen in FIG. 11, thereby engaging the limit switch and ceasing operation of the motor 102. As the strap guide assembly 230 is rotated upwards, the rotation limit stop 218 prevents the extendable spool guide swing arm 170 from rotating upwards, as well, and thus the magnetic plate 196 is disengaged from the strap guide assembly 230 and extendable spool guide swing arm 170 rotates downwards to the second position shown in FIG. 11. Thereafter, the wound strap 8 may be slidably removed from the end of the shaft 130 quickly and neatly.

While specific embodiments of the invention have been described and illustrated, such embodiments should be considered illustrative of the invention only and not as limiting the invention as construed in accordance with the accompanying claims.

What is claimed is:

1. An apparatus for winding straps comprising:
  - a motor having a shaft extending therefrom to a distal end, said shaft being rotatable thereby along a shaft axis and having a slot extending longitudinally therealong from said distal end;
  - a spool guide swing arm located proximate to said distal end of said shaft adapted to retain a strap on said shaft;
  - a strap guide front assembly located at the end of a strap guide extendable portion extending perpendicular to said shaft axis, said strap guide front assembly extending parallel to and spaced apart from said shaft axis, wherein said strap guide extendable portion is rotatable about said shaft axis between a first position substantially horizontally extending from said shaft and a second position past vertically above said shaft.
2. The apparatus of claim 1 further comprising a limit switch adapted to stop said motor when said strap guide extendable portion is at said second position.

3. The apparatus of claim 1 wherein said strap guide extendable portion is rotatably secured to a location proximate to said motor.

4. The apparatus of claim 1 wherein said strap guide front assembly includes a slot extending parallel to said shaft axis.

5. The apparatus of claim 4 wherein said slot is formed between front and rear plates.

6. The apparatus of claim 5 wherein said rear plate includes an extended tapered edge extending downwardly therefrom.

7. The apparatus of claim 5 wherein said rear plate includes a roller on a rear surface thereof.

8. The apparatus of claim 1 wherein said spool guide swing arm is rotatable about an axis parallel to said shaft axis.

9. The apparatus of claim 8 wherein said spool guide swing arm includes an extendable distal end portion.

10. The apparatus of claim 9 wherein said spool guide swing arm includes a magnet at said distal end portion adapted to engage upon said strap guide front assembly.

11. The apparatus of claim 10 wherein said spool guide swing arm includes a rotation limit stop adapted to prevent rotation of said spool guide swing arm above horizontal.

12. The apparatus of claim 1 further comprising an adjustable guide arm extending proximate to said shaft so as to position said strap between said adjustable guide arm and said spool guide swing arm.

13. A method for winding straps comprising:

passing a free end of a strap through a slot in a shaft extending from a motor to a distal end, said shaft being rotatable thereby along a shaft axis;

passing said strap through a strap guide front assembly located at the end of a strap guide extendable portion extending perpendicular to said shaft axis, said strap guide front assembly extending parallel to and spaced apart from said shaft axis; and

rotating said shaft so as to wind said strap thereabout until a distal end of said strap engages upon said strap guide front assembly thereby rotating said strap guide extendable portion and said strap guide front assembly upwardly about said shaft; and

disengaging a magnetic end of a spool guide swing arm located proximate to said distal end of said shaft so as to permit said spool guide swing arm to rotate downward permitting removal of said strap from said shaft.

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